

What is Claimed is:

1. A method of fabricating an imprint stamp, comprising:

patterning a substrate;

etching the substrate to form a pattern in the substrate;

depositing a first layer of material on the substrate;

patterning the first layer of material;

etching the first layer of material to form a portion of an application specific imprint pattern in the first layer of material, the portion including a variation in a topography of the first layer of material;

depositing an additional layer of material on a previously etched layer of material;

patterning the additional layer of material;

etching the additional layer of material to form an additional portion of the application specific imprint pattern in the additional layer of material, the additional portion including a variation in a topography of the additional layer of material;

repeating the depositing, the patterning, and the etching of additional layers of material until the application specific imprint pattern is completely defined and comprises a plurality of features that are defined by the variations in the topographies of all of the layers of material that were deposited, patterned, and etched;

segmenting the substrate to form an imprint blank that includes the application specific imprint pattern on an exposed cross-sectional surface thereof; and

selectively etching the exposed cross-sectional surface of the imprint blank to form the imprint stamp.

2. The method as set forth in Claim 1, wherein the segmenting of the substrate comprises partitioning the substrate into a plurality of individual segments along a direction that is substantially perpendicular to a surface of the substrate.
3. The method as set forth in Claim 1, wherein the selectively etching comprises an anisotropic etch.
4. The method as set forth in Claim 1, wherein the selectively etching comprises applying an etching material that selectively etches only some of the layers of material in the application specific imprint pattern, so that after the etching is completed, those layers of material that were not selectively etched stand proud of those layers that were selectively etched.
5. The method as set forth in Claim 4, wherein the selectively etching comprises an anisotropic etch.
6. The method as set forth in Claim 1, wherein the layers of material are made from a material selected from the group consisting of silicon oxide, silicon nitride, polysilicon, a metal, a metal alloy, silicon oxynitride, silicon carbide, diamond like carbon, a silicide, a tetraethylorthosilicate, a boron doped tetraethylorthosilicate, a phosphorous doped tetraethylorthosilicate, and a boron doped, a phosphorous doped tetraethylorthosilicate, a polymer, a photoresist, a dielectric material, and an electrically conductive material.
7. The method as set forth in Claim 1, wherein the substrate is made from a material selected from the group consisting of a glass, a borosilicate glass, silicon oxide, silicon nitride, aluminum oxide, and indium phosphide.
8. The method as set forth in Claim 1, wherein the substrate is a semiconductor material.

9. The method as set forth in Claim 8, wherein the semiconductor material is a material selected from the group consisting of a wafer of a semiconductor material, silicon, and a silicon wafer.

10. The method as set forth in Claim 1, wherein the plurality of features in the imprint stamp include a minimum feature size that is less than about 10.0 nanometers.

11. The method as set forth in Claim 1, wherein the plurality of features in the imprint stamp define at least one contact pad and at least one wire connected with the contact pad.

12. The method as set forth in Claim 11, wherein the plurality of features in the imprint stamp include a minimum feature size that is less than about 10.0 nanometers.

13. The method as set forth in Claim 1 and further comprising:

planarizing a last of the additional layers of material to be deposited so that the last of the additional layers of material includes a substantially planar surface.

14. The method as set forth in Claim 1 and further comprising:

planarizing the first layer of material after the depositing of the first layer of material.

15. The method as set forth in Claim 1, wherein at least one imprint stamp is connected with a master substrate.

16. The method as set forth in Claim 1 and further comprising:

depositing a conformal layer of material on the substrate, the depositing occurring after the etching of the substrate.

17. A method of fabricating an imprint stamp, comprising:

depositing a base layer of material on a substrate;

patterning the base layer of material;

etching the base layer of material to form a pattern in the base layer of material;

depositing a first layer of material on the base layer of material;

patterning the first layer of material;

etching the first layer of material to form a portion of an application specific imprint pattern in the first layer of material, the portion including a variation in a topography of the first layer of material;

depositing an additional layer of material on a previously etched layer of material;

patterning the additional layer of material;

etching the additional layer of material to form an additional portion of the application specific imprint pattern in the additional layer of material, the additional portion including a variation in a topography of the additional layer of material;

repeating the depositing, the patterning, and the etching of additional layers of material until the application specific imprint pattern is completely defined and comprises a plurality of features that are defined by the variations in the topographies of all of the layers of material that were deposited, patterned, and etched;

segmenting the substrate to form an imprint blank that includes the application specific imprint pattern on an exposed cross-sectional surface thereof; and

selectively etching the exposed cross-sectional surface of the imprint blank to form the imprint stamp.

18. The method as set fourth in Claim 17 and further comprising:

planarizing the first layer of material after the depositing of the first layer of material.

19. The method as set fourth in Claim 17, wherein at least one imprint stamp is connected with a master substrate.

20. The method as set fourth in Claim 17 and further comprising:

depositing a conformal layer of material on the substrate, the depositing occurring after the etching of the base layer of material.

21. The method as set fourth in Claim 17 and further comprising:

planarizing a last of the additional layers of material to be deposited so that the last of the additional layers of material includes a substantially planar surface.

22. The method as set fourth in Claim 17, wherein the segmenting of the substrate comprises partitioning the substrate into a plurality of individual segments along a direction that is substantially perpendicular to a surface of the substrate.

23. The method as set fourth in Claim 17, wherein the selectively etching comprises an anisotropic etch.

24. The method as set fourth in Claim 17, wherein the selectively etching comprises applying an etching material that selectively etches only some of the layers of material in the application specific imprint pattern, so that after the etching is completed, those layers of material that were not selectively etched stand proud of those layers that were selectively etched.

25. The method as set forth in Claim 24, wherein the selectively etching comprises an anisotropic etch.

26. The method as set forth in Claim 17, wherein the layers of material are made from a material selected from the group consisting of silicon oxide, silicon nitride, polysilicon, a metal, a metal alloy, silicon oxynitride, silicon carbide, diamond like carbon, a silicide, a tetraethylorthosilicate, a boron doped tetraethylorthosilicate, a phosphorous doped tetraethylorthosilicate, and a boron doped, a phosphorous doped tetraethylorthosilicate, a polymer, a photoresist, a dielectric material, and an electrically conductive material.

27. The method as set forth in Claim 17, wherein the substrate is made from a material selected from the group consisting of a glass, a borosilicate glass, silicon oxide, silicon nitride, aluminum oxide, and indium phosphide.

28. The method as set forth in Claim 17, wherein the substrate is a semiconductor material.

29. The method as set forth in Claim 28, wherein the semiconductor material is a material selected from the group consisting of a wafer of a semiconductor material, silicon, and a silicon wafer.

30. The method as set forth in Claim 17, wherein the plurality of features in the imprint stamp include a minimum feature size that is less than about 10.0 nanometers.

31. The method as set forth in Claim 17, wherein the plurality of features in the imprint stamp define at least one contact pad and at least one wire connected with the contact pad.

32. The method as set forth in Claim 31, wherein the plurality of features in the imprint stamp include a minimum feature size that is less than about 10.0 nanometers.